

# Sealift: Balancing Strategy and Capability

by Lieutenant Colonel Bradley E. Smith, US Army

**I**F, AS CARL VON CLAUSEWITZ said, “War is merely the continuation of policy by other means,” then it follows that the potential for “other means” (war) must match the policy of the state if disaster is not to ensue.<sup>1</sup> If a nation has a policy of forward displacement, as does the United States, then the war-making potential must include the combat units *and* the ability to displace them forward and sustain them there. Currently, the United States does not have that potential in the requisite amounts. What is lacking is shipping. It follows that either US policy should be changed or the war-making potential—including lift—must be increased to match the policy. Airlift is not the answer. More than 95 percent of the dry cargo and 99 percent of the liquid cargo needed to sustain land combat forces must go by sea.<sup>2</sup> Until we define those means, our diplomacy lacks teeth.

Imbalances between commitments and capabilities have existed throughout American history. Our leaders developed US foreign policy and the military responded with strategies—sometimes unresourced—to support those ends. Consequently, our Armed Forces have been committed to war unprepared, and the nation has paid a heavy price.

Prior to both World Wars and Korea, the United States pursued aggressive and sometimes provocative diplomatic initiatives, although our leaders knew full well we were unable to immediately respond militarily. Vietnam was an anomaly—we had overwhelming firepower but lacked the will. During the Cold War, we got it right. We matched diplomatic obligation with military capability. It drove the Soviet infrastructure to economic and political collapse.

Today, the United States is becoming increasingly involved around the globe, but our military potential is not keeping up. Peacetime operations tempo has never been higher, and well-intentioned assis-

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tance missions have pulled us into the affairs of other nations more deeply than we originally intended. We withdrew from Somalia after the costs became too high. We were to be in Bosnia for less than a year, yet we are still there and the possibility for escalation exists.

Our shrinking force structure and decline of other national resources, such as the merchant marine, in contrast to increased diplomatic commitments around the world, have created a dichotomy of policy and means. With a reduced forward presence, we must enhance our ability to move the continental-based force. Otherwise initial extensive loss of life is possible and the American people will not tolerate it.

Not long ago, the United States was a formidable commercial sea power. The government relied on the merchant marine for power projection as a critical fourth arm of our national defense. As of September 1996, the oceangoing segment of our merchant marine was composed of only 281 active vessels of 12.7 million deadweight tons.<sup>3</sup> We ranked 11th in the world in terms of deadweight tons and 24th in numbers of vessels. In 1995, our fleet carried only 3.2 percent of all US oceanborne foreign trade.<sup>4</sup> These figures are particularly disturbing in light of the 1,224-ship fleet in 1950. That is more

than a 77-percent decrease since the Korean War.<sup>5</sup>

We should no more feel certain that other countries will provide our strategic lift than we should feel certain they will fight alongside us. Operation *Desert Storm* demonstrated that other countries will allow us to intervene on their behalf, but some nations most reliant upon Arab oil did little to defend their interests. We need to be able to protect our own interests, and this demands more ships.

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### The Dangers Ahead

Threats to US vital interests in the 21st century are numerous, and many of them may be unforeseeable. Our national information infrastructure vulnerabilities are increasingly apparent. Terrorism, coupled with proliferation of weapons of mass destruction and disruption and the spread of extremist Muslim nationalism in the Middle East and beyond, are examples. Uncertainty exists over the future of Russia and questionable security of its poorly maintained intercontinental ballistic missile systems in the former Soviet Union. US relations with China are on a roller coaster ride at a time when it is exploding economically and moving toward superpower status. Disagreement over borders and islands throughout East Asia creates potentially volatile situations. Korea remains a powder keg. We have already been involved in Africa and the Caribbean. This is no time to let our means fall behind our policy.

Our leaders are torn between meeting their obligations at home and abroad. Pursuing the US foreign policy agenda "on the cheap" means we ultimately place our interests in jeopardy as we overextend to unacceptably high risk levels. In the past, we rationalized crossing that threshold by doing more with less in the military—an approach that was unsuccessfully used prior to both World Wars and Korea. Due to lack of lift, we face a similar situation today.

### A Break from the Past

The United States is at a pivotal point in its history. Our diplomatic policy should not be hamstrung by military limitations. The military can do only so much to bolster existing combat power without incurring additional budgetary expenses.

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Infrastructure savings from base closures to finance modernization efforts necessary for our future security are finite and subject to local political interests. It is our civilian leaders who must decide the size and type force we can politically afford and structure our national security strategy accordingly. This is a job for politicians, who must consider the larger questions of funding priorities, economic strategies and domestic prosperity, although the military should have an important advisory role. We must generate the means by which military power is employed to support our diplomacy. But an increase in nationbuilding and peacekeeping missions, for instance, requires more logistics capacity at the forefront of national policy and ultimately will demand changes in our military structure. One thing is clear, however; we must abandon the notion that divisions alone equal combat power. Strategic considerations, including the capacity for a surge lift, are essential for the employment of combat power.

Our Cold War force structure was designed to successfully counter the Soviet threat, but now we face more diverse and nebulous challenges to vital interests. We need a military that is mobile enough to respond anywhere and anytime, yet not be too focused or fixed in place. Forward-based forces and pre-positioned equipment ashore or afloat are helpful political statements of resolve, but they may not be in the right place or strong enough to do the job. *Global power does not exist without global reach.*

We need to remember that a critical part of the combat slice is strategic lift. Without it we cannot achieve strategic, dominant maneuver and move our forces from fort to foxhole.<sup>6</sup> True, in September 1996, 20 aircraft sorties flew a heavy brigade (two armor battalions and one mechanized infantry

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battalion) to Kuwait within 96 hours, but with armor already pre-positioned in-country.<sup>7</sup> That may not always be the case. Airlift alone can never do the job.

We must develop a surge capability to transport an entire Army corps and two Marine Expeditionary Forces (MEFs) in one lift to almost anywhere in the world. The 82d and 101st divisions can surge by air but will require sustainment by sea. That will require changes in our funding priorities. The ability to carry out power projection has inherent deterrent value that can partially compensate for a smaller military. Preventive defense programs will not preserve the peace if we cannot put overwhelming combat power on the ground quickly or at least credibly threaten to do so. Mass transport will give our nation's leaders the ability to place their finger on a non-nuclear trigger. It can create the diplomatic leverage we may need.

The visible capacity for rapid, massive deployments can avert war by predisposing potential adversaries toward caution. During crises or imminent conflict, just the outloading of overwhelming force is a statement of resolve. Formidable sovereign powers will be hard to impress if we cannot do it with the ships available.

The American way of war has traditionally been one of mass and maneuver. Napoleon stressed the importance of achieving overwhelming combat power at the critical time and place. Concentration of force requires movement. We may have to fight outnumbered, but we still can achieve local superiority where it counts. However, we must get to that critical point in-theater first and in strength to set terms of battle.

### **Force Structure Considerations**

The end result of the "right-sizing" process is having the right troops and equipment on hand and, most important, being able to deploy them at once.

That way we may not have to fight. That is the strategic lesson. We must always look too strong to be challenged—and that is not solely the result of counting combat flags and modernization efforts. It must include increasing our sealift capacities to allow us to immediately employ whatever force structure is in existence at any given time. *Flexible deterrent* options are contingent upon strategic transport.

Two MEFs can each consist of one air wing, one force service support group and one division with three brigades. The 3rd Marine Division in Okinawa now has only four infantry battalions on station but carries the overhead of a standard-size division. The MEFs conduct seaborne landings and can be followed by the Army. For that reason, we need to retain the capability to conduct amphibious assault landings with at least one MEF in a single lift.

The Army must have the ability to move, simultaneously, at least five heavy divisions, two corps support commands (COSCOMs) and two corps headquarters, in addition to the initial insertion of airborne and airmobile divisions. We must retain the airborne and airmobile divisions in the force structure, but we need only one other light division. It is important to remember the lessons of Mogadishu—we must be able to place armor on any terrain suitable for tracked vehicles. Had we sufficient lift during the Persian Gulf War, the 82d Airborne would not have been out on a limb for as long as it was. We can rush the light forces in by air to show national commitment and resolve, but overwhelming heavy forces must arrive by sea soon thereafter or potential adversaries will not hesitate to attack our light forces.

The three divisional light infantry brigades can be used for humanitarian or peace support purposes and to augment or follow heavy forces. Deployment of helicopters by strategic air is possible but it ties up critically short assets and is vulnerable to armored attack until completion of reassembly. The preferred deployment method is the aircraft carrier, which can move them close enough to theater to allow self-deployment to tactical assembly areas. Other carriers can provide additional air support requested by Marines and soldiers ashore. But we still need the proper type and number of ships to put armor ashore promptly, in mass and sustain it there.

Besides additional lift, the Navy needs an arsenal ship to provide deep fires for land forces or punitive strikes. We also need numerous smaller vessels to conduct blockades and escort logistic vessels through dangerous waters. The Navy should keep its hospital ship, build more shallow-water



The USS *Gunston Hall* during *Desert Shield* operations in the Persian Gulf, 1990.

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minesweepers and develop greater shallow-water, anti-diesel electric submarine capabilities.

Given competing domestic interests, the Department of Defense (DOD) may have fewer resources in the future. The cuts cannot go on indefinitely. In any area of the world where we currently have military forces committed, it is hard to imagine anything less than two Army corps and two MEFs to control deteriorating situations in two separate geographic regions. This is absolutely the smallest size force we should be able to deploy rapidly by sea.

### Moving the Force

This notional two Army corps—consisting of three armor divisions, two mechanized infantry divisions and two COSCOMs—along with both the airborne and airmobile divisions and two MEFs cannot be deployed in one lift by available ships today. The congressionally mandated *Mobility Requirements Study* to deploy anywhere in the world “a light brigade in four days; a light division in 12 days; a heavy brigade afloat in 15 days; two heavy divisions in 30 days; and a five-division contingency corps in 75 days” is probably too little, too late.<sup>8</sup> But to do even that job, a minimum of eight fast sealift ships (FSS), 19 large medium speed roll-

on roll-offs (LMSRs) and 21 roll-on roll-off (RORO) vessels are needed to shuttle the force into position. These goals will not likely be achieved anytime soon, given budget constraints now and in the future.

A systemic approach that identifies total shipping requirements for the land forces and total existing sealift assets leads to less optimistic conclusions as follows:

- Dry cargo surge requirements must be calculated for the notional force consisting of five Army heavy divisions, two COSCOMs and two MEFs. Requirements are standardized in terms of LMSR vessels and nonself-sustaining containerships (NSSCS).

- Existing sealift capabilities must be tallied and translated into LMSR and NSSCS equivalents for comparison purposes. Since there is little standardization in US ship construction, common denominators of ship equivalents are necessary. Additionally, the Marines must have amphibian transports to conduct forced-entry operations, which must be included in strategic lift capabilities.

- Bulk petroleum requirements must be examined.

The current approach has several drawbacks. It appears to reduce to understandable terms a complex and interdependent logistics system without

## Photo Not Available

The Ready Reserve Force's breakbulk ship USNS *Cape Archway*, operating in the Red Sea during Operation *Desert Storm*, February 1991.

Without crewing or maintenance considerations, the RRF can ideally provide 16 LMSR equivalents. The RRF is maintained at higher states of readiness—advertised at four, five, 10 and 20-day recall status. But not all this capability is available. First, *Desert Storm* underscored the fact that the RRF is not being maintained to standard. Unfunded maintenance from years past resulted in late deployments for 33 of the first 44 activations. Second, some of the vessels have little military utility. . . . Third, not enough US mariners exist to man the active merchant fleet and the entire RRF. During *Desert Storm*, only 42 of the vessels could be activated due to crew constraints.

thoroughly analyzing all the factors. The methodology assumes 100-percent vessel availability, which is unrealistic. There will be ship losses from mechanical failure, sabotage or enemy interdiction. Also, follow-on sustainment is not quantified. Of course, the same vessels used for surge lift can be offloaded and return, but that takes time. A large portion of the Maritime Security Program (MSP)—the containerships—are ideally suited for sustainment from the outset.

Nothing in this article addresses the US Air Force's needs. Strategic air can operate from home base and needs no surge lift. Initial tactical air will be supplied from the Marine air wings and carrier air wings. The needs of subsequent tactical air will depend upon the time and location of its insertion, but realistically could hardly consist of fewer than five wings and would have to be calculated by the Air Force according to its doctrine. But it clearly would require significant additional dry cargo and bulk petroleum capacity.

### Calculating Dry Cargo Surge Requirements

After carefully calculating dry cargo surge requirements, 52 LMSR and three NSSCS equivalents are needed to move in one lift the two notional Army corps.<sup>9</sup> Vessels could be combat loaded to

maintain division integrity, but COSCOM equipment would have to be split among the vessels to achieve 75-percent deck stowage.

The lift requirements for two notional MEFs include amphibious shipping needed to assault beaches. Today, the Navy has 36 amphibians in the force structure, which can almost support beach assaults by one MEF.<sup>10</sup> In addition, 25 LMSR and two NSSCS equivalents would be needed for follow-on echelon movement.<sup>11</sup>

The total lift requirements to move notional Army and Marine forces total 77 LMSR equivalents, 36 amphibians and five containerships. More than twice as many amphibians would be needed if two expeditionary forces were to conduct beach assault operations. The next step in calculating lift shortfall is to calculate current on-hand capabilities.

### Tallying Existing Sealift Capabilities

Sealift that is currently available and militarily useful for surge purposes totals 35 LMSR and eight NSSCS equivalents as depicted in the figure.

The MSP provides subsidies to 10 commercial carriers to keep 47 vessels available in times of war and national emergency—similar to the Civil Reserve Air Fleet (CRAF) program for airlines. Of these 47 ships, 41 are medium to large container-

ships and lighters aboard ship (LASH). Because of their tremendous volume, they are equivalent to 84 NSSCS.<sup>13</sup> The containerships provide follow-on sustainment capability and the lighters are ideally suited for ammunition carriage. Sea sheds and flatracks could be used in the container cells to create decks for tracked vehicles and rolling stock, but other containerships will be needed for resupply.<sup>14</sup>

The remainder of the MSP is three RORO and three car/truck carriers that have the capacity of five LMSR equivalents.<sup>15</sup> The car/truck carriers are terrible from the warfighter perspective—their low decks and pounds per square inch limitations severely restrict the type equipment that can be loaded. The carriers absorb all the light trucks and trailers throughout the corps and create horrific command and control challenges in-theater. Unit integrity is destroyed and combat loading becomes impossible. Units participating in *Desert Storm* encountered these problems and even during the peacetime redeployment of VII Corps equipment back to Europe. We should give up the car/truck carriers.

Maritime Administration maintains 219 inactive ships in its National Defense Reserve Fleet (NDRF).<sup>16</sup> Except for the 94 ships in the NDRF that are maintained to higher maintenance standards and called the Ready Reserve Force (RRF), the NDRF is completely useless militarily. Decrepit maintenance conditions are the norm, and power plants are so old that it would be extremely difficult to find any qualified crews. At best it is a floating repair parts cannibalization point.

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the RRF is not being maintained to standard. Unfunded maintenance from years past resulted in late deployments for 33 of the first 44 activations.<sup>19</sup> Second, some of the vessels have little military utility, such as antiquated breakbulks and troopships designated for use by the Federal Emergency Management Agency for domestic crises. Third, not enough US mariners exist to man the active merchant fleet and the entire RRF. During *Desert Storm*, only 42 of the vessels could be activated due to crew constraints.<sup>20</sup>

Even so, the RRF does have considerable military value. Crane ships and heavy lift vessels must be kept for contingencies that involve offshore discharge, logistics over the beach and offloading at developed/damaged/destroyed fixed ports. The vessels in highest demand for most scenarios would be the 31 RORO and 10 oil tankers, which are about the most we could crew seven years ago. Today, there are even fewer crews available. Under ideal conditions, the RRF could contribute 14 LMSR equivalents with the RORO and provide valued tanker support.<sup>21</sup>

	Dry Cargo Surge	Sustainment
Maritime Security Program (MSP)	5 LMSR	41 Container / LASH (Lighters Aboard Ship) Vessels
National Defense Reserve Fleet (NDRF)	0 LMSR *	
Ready Reserve Force (RRF)	14 LMSR *	10 Tankers
Maritime Pre-positioning Squadrons (MPSRON) 1,2,3	6 LMSR / 4 NSSCS	
Fast Sealift ships (FSS)	6 LMSR	
Army War Reserve (AWR-3)	4 LMSR / 4 NSSCS	
Totals	35 LMSR / 8 NSSCS	

\* The NDRF has no militarily useful vessels except the RRF portion. The RRF has the square footage and 20-foot equivalent unit (TEU) capacity of 16 LMSR vessels, but in fact we can only plan on using 14 LMSR equivalents because of anticipated crew shortages. It also has 10 tankers capable of carrying 2.1 million barrels of petroleum that will be significant.

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Military Sealift Command (MSC) controls 13 ships in Maritime Pre-positioning Squadrons (MPSRON 1, 2 and 3), eight common user fast sealift ships and 12 ships in the Army War Reserve (AWR-3) pre-positioned afloat for a total of only 16 LMSR and 8 NSSCS equivalents.<sup>22</sup> The other portion of the MSC active fleet directly supports US Navy operations and is not available to support land force deployments.

### **Bulk Petroleum Requirements**

Bulk petroleum poses significant challenges. First, the only tanker resources dedicated to theater surge and sustainment are the 10 tankers in the RRF with a total capacity of 2.1 million barrels—enough to sustain the notional land force for only 14 days.<sup>23</sup> We cannot count on pre-positioned stocks because they may be in the wrong place. Amphibians carry some bulk fuels for the Marines, but these supplies will not last long. The Navy has tankers, but their primary mission is to support operations on the high seas. Diverting commercial tankers to support military operations might be resisted by shippers, carriers and customers. Commerce around the world would be adversely affected.

To sustain the notional land force that consumes 153,700 barrels of bulk petroleum a day, a tanker fleet capable of carrying 4.9 million barrels is needed, given a 32-day cycle time to upload, sail, discharge and return.<sup>24</sup> At present, there is only 43 percent of this capability in the RRF.<sup>25</sup> Under ideal conditions, we would find refineries closer to the theater which would reduce turnaround times and total liquid carriage requirements, but we cannot count on that.

A 4.9 million barrel tanker fleet is the absolute minimum size required. It does not account for capacity lost to damaged, destroyed or broken ships. It assumes fair weather so vessels arrive on time. Calculations for the tactical Air Force have not been included. Finally, time-phased distribution requires fuel stockpiles be built up early to permit offensive operations. That requires a surge which we do not have at present. It will do no good to have the equipment arrive in-theater with no fuel to support and sustain ground forces.

Even with sufficient dedicated petroleum tanker support, delays still might ensue in a tactical over-the-beach scenario. While the active Navy regularly exercises its offshore petroleum discharge systems, their Army counterpart, whose mission is to receive petroleum at the shoreline and store it in tactical petroleum terminals, has transferred its capabilities to the US Army Reserve (USAR). While the USAR is fully able to carry out its assigned missions, time is lost waiting for the political decision to activate the Reserves and preparing for deployment. This limitation will put a hold on theater operations.

### **Strategic Lift and National Military Strategy**

Comparing sealift requirements to move the notional land force to existing sealift reveals that we need 77 LMSR equivalents but only have 35 on hand, or 46 percent of our needs fulfilled. The Marines have only half the amphibians they need to put two MEFs ashore simultaneously. There is ample containerized lift. The MSP's major contribution is the containerization it provides, allowing valuable lift to be allocated to sustainment purposes.<sup>26</sup> However, we are still critically short of assets to carry bulk petroleum and get it ashore in austere theaters where we are denied commercial pipeline access.

The near-term solution to correct the shortfalls in sealift is to purchase the equivalent of 25 additional LMSRs beyond the 17 currently planned for construction, and we should more than double our military bulk petroleum carriage capacity. Critics will argue this is excessive. But these ships could be used regularly and relieve some of the tremendous burden being placed upon Air Force C-130, C-141, C-5 and C-17 transports that are aging quickly. Because surface transport operating costs are considerably cheaper pound for pound than air, joint and combined exercises worldwide and rehearsing large unit moves would once again be possible and with far greater frequency. To ease tactical commanders' access to these vessels, MSC could develop a program similar to Air Mobility



The oiler USS *Neosho* cruises alongside the commercial tanker SS *Erma Elizabeth* during preparations for refueling.

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Command (AMC) Special Assignment Airlift Mission procedures, which have proven responsive to changing situations.

Sufficient sealift would give the National Command Authority the option of ordering uploads in anticipation of a second major theater war. Hence, a concern of the Joint Chiefs of Staff—total asset visibility—would gain credibility. At present, the concern is monitoring the buildup of combat power as it is shuttled into theater. With the “one lift” approach, the force will arrive offshore almost simultaneously.

### Alternative Courses of Action

The ideal, long-term solution is the resurrection of our commercial merchant marine as the fourth arm of our national defense. Admiral Alfred T. Mahan emphasized that all great nations are commercial seagoing powers—not only for reasons of trade but also for the military applications. But any rebirth of our commercial ocean liner industries is unlikely in the near future, given the complex fac-

tors at work in the global market. Thus, we must provide strategic lift by vessels under military control.

Another way to guarantee military access to commercial carriage might be to do for sealift what AMC did for airlift. The CRAF has been a real success story in the last several years with more airlift enrolled than current war plans require.<sup>27</sup> The key to success was consolidating all government travel under the General Services Administration. The “*Fly America*” Act reserves all this business for US airlines. Any carrier that wanted a piece of the business had to enroll at least 30 percent of its fleets (double the previous requirement) in CRAF before bidding on specific routes. It became too lucrative for any carrier to ignore.<sup>28</sup>

Our government has maritime preference laws—the *Military Transport Act of 1904*—that give US flag carriers first claim to all cargo procured for, or owned by, DOD. The *Cargo Preference Act of 1954* requires at least 75 percent of government cargo be shipped aboard US vessels, and the 73rd Congress’ *Public Resolution 17* reserves all Export-



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Import Bank cargo.<sup>29</sup> However, the exceptions to the legislation are so numerous that the full effect and benefits to carriers are diluted.<sup>30</sup> We need a "Sail America" act that permits no exceptions and ties all US government cargo going by sea to obligations to support our military in time of need.

The *Maritime Security Act of 1996* established the Voluntary Intermodal Sealift Agreement Program, which was a step in the right direction, but it did not go far enough. A Joint Planning Advisory Group promotes military use of the US flag fleet and refines the civil-military interface but does not incur legal obligations to perform wartime duties in return for access to government cargo.<sup>31</sup> The Navy could take an approach similar to the Air Force to leverage commitments from private enterprise in the best interests of the nation.

Foreign policy (ends) and military capabilities (means) must balance for true diplomatic credibility and deterrence to exist. Only Congress and the president can bring the differences between ends and means more closely into alignment, and only they can determine the size and type force we can afford.

While DOD cannot make foreign policy, it does help define the means by which diplomacy is conducted. First, it maximizes warfighting capability, given allotted resources, and thereby does its part to narrow the gap between foreign policy ends and military means. Increased sealift as an integral part

of the division package will enable us to capitalize on combat power to deliver heavy divisions quickly and in mass. Power projection increases the military option, even with additional reductions in force that are inevitable.

The DOD can identify imbalances between combat units and the strategic lift required for true combat power. The Marine Corps has done a better job than the Army in making that connection in their funding proposals. But both services need to provide more comprehensive funding proposals to Congress that include necessary sealift for all their division or MEF packages. What sense does it make to fund a heavy division that cannot arrive in-theater until six months after commencement of hostilities?

Elected officials must be able to see the total picture for land forces. When a packaged *capability* is voted upon, the impact upon *commitments* will be more clear. Legislators will have a better understanding of what they are buying. Funding decisions can be made more rational if the decision makers stay focused on the systemic whole and not on the pieces. When DOD offers a multitude of separate programs, none of which are clearly interwoven into a systemic whole, it tempts legislators to carve away at the edges of the individual pieces with no clear understanding of program interdependencies. Cuts have been made around the periphery of individual programs for so long that the core is now being threatened. If the force structure must radically shrink while the ways in which resources are allocated to the services remain unbalanced, the country is going to be in trouble.

The nation stands to gain from a stronger defense that can be bolstered by not allocating more resources, but by allocating resources differently. The commitments we have taken on as a country require a more robust force structure, but that is unlikely at this time. We must make up the difference by providing lift capacity. That will be the first step in fundamentally changing the way our national military and security strategies are developed and implemented over time. *MR*

## NOTES

1. Carl von Clausewitz, *On War* (1831), 87.
2. Glenn W. Goodman, Jr. and Scott C. Truver, "An Exclusive AFJ [Armed Forces Journal] Interview with Vice Admiral Walter T. Pionti, Jr., USN," *Armed Forces Journal International* (July 1987), 48.
3. A deadweight ton (dwt) is a unit of measure used to express a vessel's cargo carrying capacity and is equivalent to 2,240 pounds. Commission on Merchant Marine and Defense, *First Report: Appendices* (1987), 177.
4. US Department of Transportation (US DOT), Maritime Administration (MARAD), *MARAD '96* (May 1997), 40.
5. Donald H. Horner Jr., "Federal Regulation of the Liner Industry," *TRANSLOG* (December 1986), 6. Compare these findings to those presented in US DOT, *MARAD, MARAD '96* (May 1997), 40, 43.
6. Joint Chiefs of Staff, *Joint Vision 2010* (1997), 20-21.
7. *Army Times* (Springfield, VA), 3 February 1997, 14.
8. Department of the Army, *United States Army Posture Statement FY 98, Soldiers Are Our Credentials: America's Army-The Force of Decision for Today,*

*Tomorrow and the 21st Century* (1997), 14.

9. Lift requirements for three armor divisions are 4,642,656 square feet (sq.ft.) and 4,689 20-foot equivalent unit (TEU) containers. Lift requirements for two mechanized infantry divisions are 3,087,962 sq. ft. and 3,092 TEU. Lift requirements for two corps support commands (COSCOMs) are 4,664,716 sq.ft. and 5,314 TEU. Total lift requirements for the notional Army force are 12,395,334 sq.ft. and 13,095 TEU. Since one large medium speed roll-on roll-off (LMSR) has the capacity to carry 243,000 sq.ft. of cargo (at 75 percent deck utilization) and 180 TEU, one nonself-sustaining containership (NSSCS) has the capacity to carry 1,534 TEU, the notional Army force requires 52 LMSR and three NSSCS equivalents to be moved in one lift. Military Traffic Management Command (MTMC) Transportation Engineering Agency, *Deployment Planning Guide: Transportation Assets Required for Deployment* (September 1994), A-4, A-6, A-7, A-9, A-10, B-4, B-6, B-7, B-9, B-10, B-11 and 8.

10. The US Navy (USN) has three amphibious assault ships, multipurpose (total carriage capacity of 78,328 sq.ft. at 100 percent deck utilization), five am-

phibious assault ships, general purpose (total carriage capacity of 135,515 sq.ft. at 100 percent deck utilization), one amphibious assault ship, helicopter (total carriage capacity of 4,036 sq.ft. at 100 percent deck utilization, but is being converted to a mine sweeper and therefore cannot be considered an amphibian), 12 amphibious transport docks (total carriage capacity of 187,354 sq. ft. at 100 percent deck utilization) and 16 dock landing ships (total carriage capacity of 200,700 sq. ft. at 100 percent deck utilization). The grand total for the 36 vessels is 601,897 sq. ft. at 100 percent deck utilization. At 75 percent deck utilization, 451,423 sq. ft. is available for use. MTMC Transportation Engineering Agency, *Reference 94-700-2: Logistics Handbook for Strategic Mobility Planning* (April 1984), 53, 60-64; Telephone interview with CAPT Russell E. Miller, US Marine Corps, strategic sealift officer, Headquarters (HQs), USMC, Arlington, VA, 9-10 July 1997.

11. Total lift requirements for two Marine Expeditionary Forces (MEFs) are 7,306,274 sq.ft. of cargo and equipment—to include 6,000 TEU. So, the 7,306,274 sq.ft. is allocated as follows: Amphibians will carry 451,423 sq.ft. The 6,000 TEUs account for 960,000 sq.ft. To compute total carriage, one TEU takes 160 sq.ft. of deck space, multiplied by 6,000 which equals 960,000 sq.ft.) The remainder of 5,894,851 sq.ft. must go aboard strategic sealift vessels-LMSR equivalents. Since one LMSR has the capacity to carry 243,000 sq.ft. of cargo at 75 percent deck utilization, and 180 TEU, one NSSCS has the capacity to carry 1,534 TEU; the notional Marine force requires 25 LMSR, two NSSCS and 36 amphibians. MTMC Transportation Engineering Agency, *Deployment Planning Guide: Transportation Assets Required for Deployment*, (September 1994), 8; Telephone interview Miller, USMC, Arlington, 9-10 July 1997; Telephone interview with LTC Michael W. Lavigne, USMC, section head, LPO-2, Headquarters, USMC, Arlington, 7-8 July 1997; USMC, *Force Module Rollup Report* (10 July 1997), 2-3.

12. A TEU is a standard shipping container with exterior dimensions of 20 feet (length) by eight feet (width) by eight feet (height).

13. The 41 ships consist of 21 large container ships, 15 medium-size container ships and five lighter aboard ship (LASH) vessels with a capacity of 128,661 TEU containers. Since one NSSCS has the capacity to carry 1,534 TEU, the 41 Maritime Security Program (MSP) ships equate to 84 NSSCS. Edward V. Kelly, "A New Framework for the US Flag Fleet," *Sea Power* (May 1997), 52; MTMC Transportation Engineering Agency, *Deployment Planning Guide: Transportation Assets Required for Deployment* (September 1994), 8.

14. A sea shed is a temporary deck with four sides and an open top. Its volume equals that of four and a half containers. The shed is lowered empty between container cell guides into the ship's hold. Once in position, the cargo and/or equipment is lowered by crane onto the sea shed deck and tied down. Because the sheds may be stacked one on top of the other, maximum use of container space is possible. Flatracks are similar to sea sheds in that they are temporary decks with open tops that slide into position between container cell guides inside the ship's hold. Flatracks, however, are the size and shape of two standard containers stacked one on top of the other. They have two ends but no sides. That makes it possible to create a deck of indefinite length by placing an indefinite number of flatracks side-by-side inside a container ship. This newly created deck is heavy duty—suitable for practically any unit equipment or military cargo to include the M1A2 Main Battle Tank. Office of the Chief of Naval Operations, *Strategic Sealift Program Information* (1985), 38 and 39.

15. Kelly, 8. The three RORO and three car/truck carriers have a total carriage capacity of 1.4 million sq.ft., or 1,050,000 sq.ft. at 75 percent deck utilization. Since one LMSR has the capacity to carry 243,000 sq.ft. of cargo (at 75 percent deck utilization), the six MSP vessels equate to five LMSRs.

16. Edward, 53.

17. The RRF has 31 RORO (total carriage capacity of 4,505,689 sq. ft. at 100 percent deck utilization and 204 TEU containers), 34 breakbulk (total carriage capacity of 335,343 sq.ft. at 100 percent deck utilization and 585,223 measurement tons), three heavy lift SEABEE (total carriage capacity of 114,367 sq.ft. at 100 percent deck utilization and 69,081 measurement tons), nine crane ships (total carriage capacity of 219,980 sq.ft. at 100 percent deck utilization and 1,857 TEU) and a tenth crane ship currently under the operational control of the Army War Reserve (AWR)-3. The grand total for these vessels is 5,175,379 sq.ft. at 100 percent deck utilization. At 75 percent deck utilization, 3,881,534 sq.ft. of space is available for use. These same vessels can carry 2,061 TEU and have the capacity for 654,304 measurement tons. Since one LMSR has the capacity to carry 243,000 sq.ft. of cargo (at 75 percent deck utilization) and 180 TEU and, since one NSSCS has the capacity to carry 1,534 TEU, the RRF equates to 16 LMSR and zero NSSCS-without consideration of crew availability. The RRF additionally has two troopships, 10 tankers and four LASH. The troopships are used by the Federal Emergency Management Agency for domestic civil emergencies. The 10 tankers carry 2,106,356 barrels of petroleum products. The LASH are designated transports for ammunition, even though they could carry other cargo and equipment. Their total carriage capacity is 119,519 sq.ft. of cargo at 100 percent deck utilization and 1,862 TEU. Given limited crew availability, we should plan on manning the 31 RORO (14 LMSR equivalents) and 10 tankers for most contingencies. MTMC Transportation Engineering Agency, *Deployment Planning Guide: Transportation Assets Required for Deployment*, 8; Telephone interview with LCMR William N. Hughes, USN, action officer, Sealift Team, Mobility Analysis Division, US Transportation Command (TRANSCOM), Scott Air Force Base, IL, 28 June 1997; Telephone interview with Andres L. Hark, vessel custody analyst, Division of Reserve Fleet, MARAD, US DOT, Washington, DC, 8 July 1997; US DOT, MARAD, *Memorandum: RRF Dry Vessel Cargo Projection* (18 December 1996), 1-14.

18. Kelly, 53.

19. CAPT Douglas M. Norton, USN, "Sealift: Keystone of Support," *Proceedings* (May 1991), 44.

20. US House of Representatives, *Hearings before the Subcommittee on Merchant*

*Marine and Fisheries, Serial Number 101-120* (18 and 26 September 1990), 6.

21. The 31 RORO have a total carriage capacity of 4,505,689 sq.ft. at 100 percent deck utilization. At 75 percent deck utilization, 3,379,267 sq.ft. of space is available for use. At 75 percent deck utilization, the 31 RORO equate to 14 LMSR.

22. Maritime Pre-positioning Squadron (MPSRON) 1 has four vessels with a total carriage capacity of 608,893 sq.ft. at 100 percent deck utilization and 2,311 TEU containers. MPSRON 2 has five vessels with a total carriage capacity of 607,975 sq.ft. at 100 percent deck utilization and 2,020 TEU. MPSRON 3 has four vessels with a total carriage capacity of 608,740 sq.ft. at 100 percent deck utilization and 2,311 TEU. The grand total for the 13 vessels is 1,825,608 sq.ft. at 100 percent deck utilization and 6,642 TEU. At 75 percent deck utilization, 1,369,206 sq.ft. is available for use and 180 TEU. Since one NSSCS has the capacity to carry 1,534 TEU, MPSRON 1, 2 and 3 equate to six LMSR and four NSSCS. MTMC Transportation Engineering Agency, *Deployment Planning Guide: Transportation Assets Required for Deployment*, 8; Telephone interview with MAJ John Simmons, USMC, strategic sealift officer, HQs, USMC, Arlington, 8 July 1997. The eight fast sealift ships (FSS) have a total carriage capacity of 1,760,000 sq.ft. at 100 percent deck utilization and 360 TEU containers. At 75 percent deck utilization, the usable space is 1,320,000 sq.ft. Since one LMSR has the capacity to carry 243,000 sq.ft. (at 75 percent deck utilization) and 180 TEU, the eight FSS equate to six LMSR. MTMC Transportation Engineering Agency, *Deployment Planning Guide: Transportation Assets Required for Deployment*, 8; Telephone interview with Hughes, USN, US TRANSCOM, 28 June 1997. AWR-3 has two container ships with a total carriage capacity of 90,000 sq.ft. at 100 percent deck utilization and 3,344 TEU containers, two LMSR (total carriage capacity of 648,000 sq.ft. at 100 percent deck utilization and 360 TEU), two RORO (total carriage capacity of 365,000 sq.ft. at 100 percent deck utilization), one crane ship (total carriage capacity of 15,360 sq.ft. at 100 percent deck utilization and 507 TEU) and one lift-on lift-off (LOLO) with a total carriage capacity of 82,000 sq.ft. at 100 percent deck utilization and 1,413 TEU. The grand total for these dry cargo vessels—not including the ammunition carriers—is 1,200,360 sq.ft. at 100 percent deck utilization and 5,624 TEU. At 75 percent deck utilization, 900,270 sq.ft. of space is available for use. Since one LMSR has the capacity to carry 243,000 sq. ft. of cargo (at 75 percent deck utilization) and 180 TEU, and, since one NSSCS has the capacity to carry 1,534 TEU, these vessels equate to four LMSR and four NSSCS. The AWR-3 additionally has one float-on float-off (FLOFLO) and three LASH. The FLOFLO has 52,401 sq.ft. for Army watercraft, 25 TEU for Army watercraft equipment and 10,000 barrels of diesel fuel marine. The three LASH vessels carry 64 barges that are designated transports for ammunition, even though they could carry other cargo and equipment. MTMC, *Transportation Engineering Agency, Deployment Planning Guide: Transportation Assets Required for Deployment*, 8; Telephone interview with Hughes, 28 June 1997; Telephone interview with John C. Henry, AWR-3 project officer, FM32, Washington Navy Yard, Washington, DC, 16 July 1997.

23. Daily petroleum requirements for the notional Army force under conditions of intense combat are as follows: Three armor divisions require 1,697,223 gallons (gal.) of JP8 and 139,293 gal. of MOGAS. Two mechanized infantry divisions require 1,087,502 gal. of JP8 and 92,778 gal. of MOGAS. Two COSCOM require 275,268 gal. of JP8 and 84,342 gal. of MOGAS. Grand totals for the notional Army force are 3,059,993 gal. of JP8 and 316,413 gal. of MOGAS. Together the JP8 and MOGAS total 3,376,406 gal. or 80,391 barrels of bulk fuel needed each day (42 gal. equal one barrel). Daily petroleum requirements for notional two MEF Marine force are 3,078,992 gal. or 73,309 barrels per day. The total daily bulk fuel requirement for the notional land force are 153,700 barrels per day. Dividing the carriage capacity of the 10 RRF tankers (2,106,356 barrels) by the daily bulk fuel requirement of the notional land force (153,700 barrels), it equals 13.7 days or 14 days of supply. Combined Arms Support Command, *Operations Logistics Planner, Version 1.30* (4 January 1996), 1-2; Telephone interview with CW5 David A. Willoughby, USMC, director, Marine Corps Petroleum Training, Petroleum Water Department, Fort Lee, VA, 22 July 1997; Telephone interview with LTC Robert M. Bayless, US Army, instructor, Department of Logistics and Resource Operations, US Army Command and General Staff College, Fort Leavenworth, KS, 21 July 1997; USMC, *Marine Corps Warfighting Publication 4-25.5: Bulk Liquids Operations* (August 1996), 4-4.

24. Over the long run, we need an average of 153,700 barrels of petroleum delivered each day to the theater. The cycle time for one of these 153,700 barrel increments is 32 days, calculated as follows: one day to load 153,700 barrels, 15 days to sail to theater, one day to discharge and 15 days to return. 153,700 barrels times 32 increments equals a 4,918,400 barrel capacity, or a 4.9 million barrel capacity fleet.

25. Current carriage capacity of the 10 RRF vessels (2,106,356 barrels) divided by the total carriage requirement (4,918,432 barrels) reveals that about 43 percent of the requirement is actually fulfilled at the present time.

26. MSP has a containerization capacity of 128,661 TEU—more than six times the containerization requirement of 19,095 TEU for the notional land force. Kelly, 52; MTMC Transportation Engineering Agency, *Deployment Planning Guide: Transportation Assets Required for Deployment*, A-4, A-6, A-7, A-9, A-10, B-4, B-6, B-7, B-9, B-10, B-11 and 8.

27. Air Mobility Command, *Introduction to the Civil Reserve Fleet* (1997), 7; Telephone interview with COL Murrell D. Porter, US Air Force, chief, Civil Reserve Air Fleet, Scott Air Force Base, IL, 13 March 1997.

28. Ibid.

29. Commission on Merchant Marine and Defense, *Second Report: Recommendations* (1987), 19; US DOT, MARAD, *MARAD '86: The Annual Report of the Maritime Administration for Fiscal Year 1986* (1987), 23.

30. *Florida Times Union* (Jacksonville), 30 August 1986, A-1, A-14; MTMC *Regulation 55-67: Cargo Booking and Ocean Carrier Administration* (1987), 10.

31. Kelly, 52, 53; US DOT, MARAD, *MARAD '86: The Annual Report of the Maritime Administration for Fiscal Year 1986* (1987), 1-2.

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